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(54) Slide module for prosthetic alignment device

(57) The module comprises a first member 1 having sets of parallel tongues or grooves 4 in one face and a slot 5 substantially perpendicular to the tongues or grooves, a second member 2 having two faces each having sets of parallel tongues or grooves 8, 9 and a substantially central hole 10, the tongues or grooves of one face being substantially perpendicular to those of the other face, and a third member 3 having sets of parallel tongues or grooves 12 in one face and a slot 13 substantially perpendicular to the tongues or grooves. Sets of tongues or grooves 4 and 8 are selectively interengaged to provide relative adjustment between members 1 and 2 in one direction, and selective interengagement of sets of tongues or grooves 12 and 9 provides relative adjustment between members 2 and 3 in another, perpendicular, direction. The module is secured together by means of a bolt passed through slot 13, hole 10 and slot 15, the bolt also preventing relative movements between members 1, 2 and 2, 3 in directions parallel to their respective interengaged tongues and grooves.

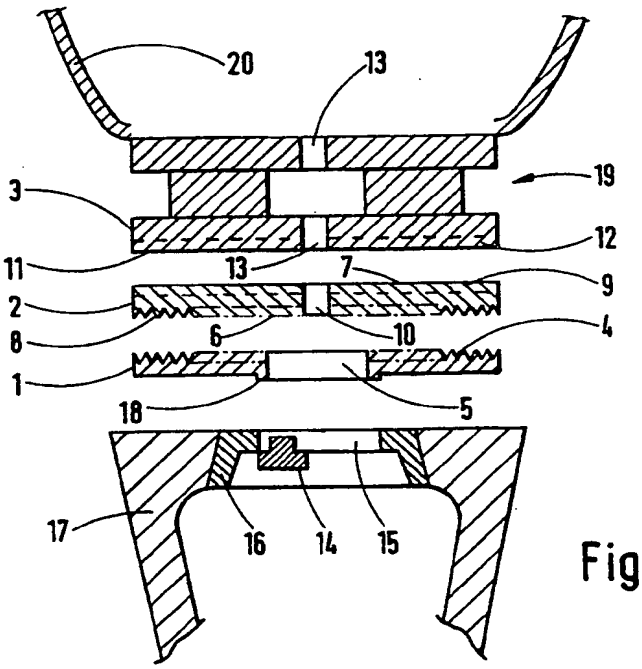

Fig.1

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The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

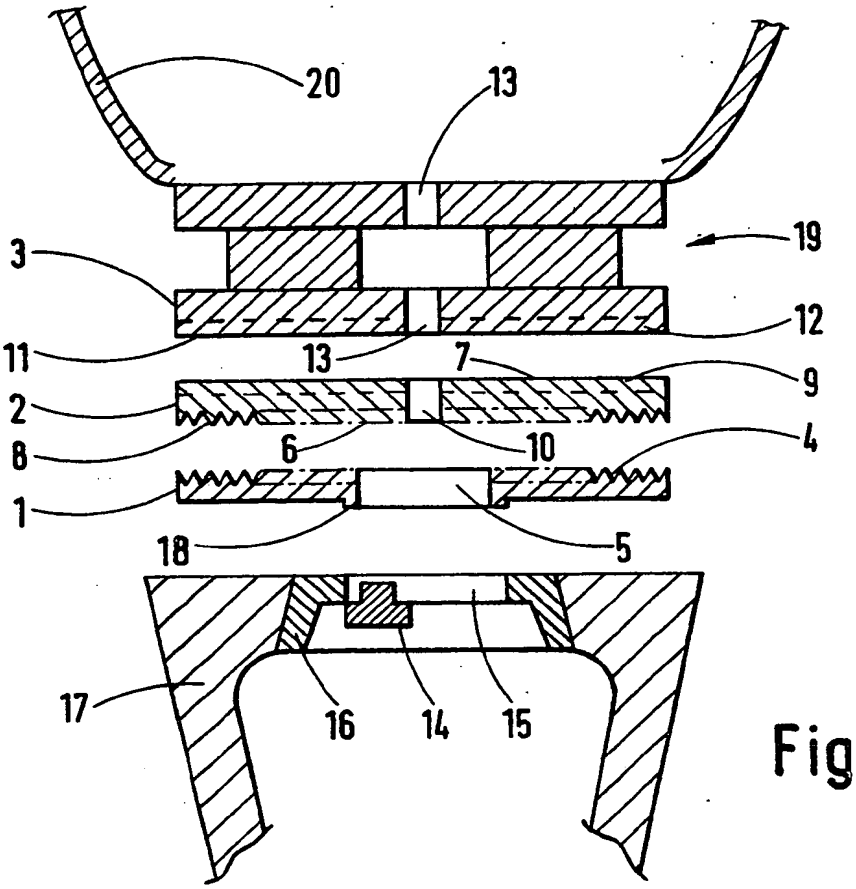

Fig.1

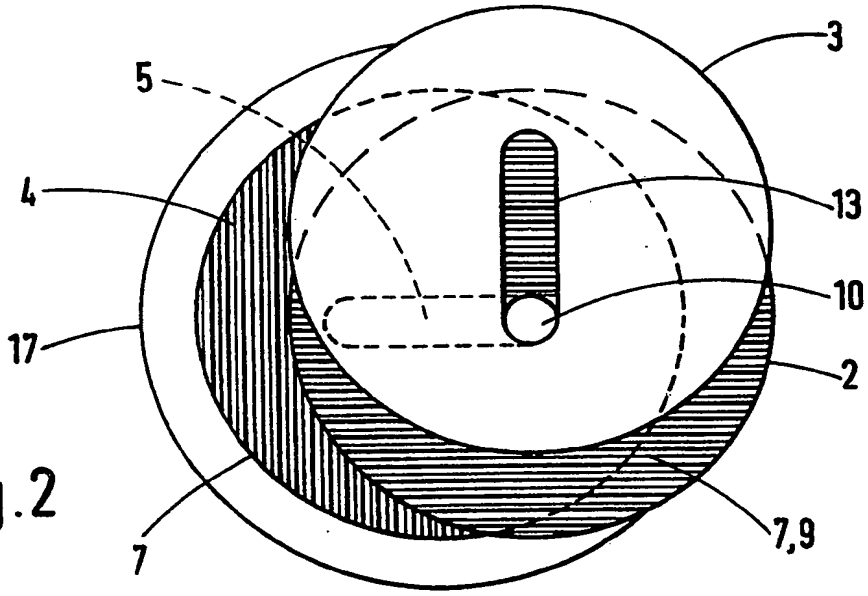

Fig.2

SPECIFICATION

Slide module for prosthetic alignment device

The present invention relates to a slide module for a prosthetic alignment device.

A slide module or unit is used within a prosthesis to allow linear adjustment of one section of the prosthesis e.g. the shank, relative to another section, e.g. the socket. This adjustment should be in Anterior-Posterior (AP) and Medial-Lateral (ML) directions.

A known unit utilises a system of perpendicular slots and sliding bolts. This unit requires two bolts and locking nuts and is difficult to lock into position. It relies only on the friction between its parts to achieve a secure locking. Further, the linear adjustment established by this device can only be crudely judged by eye.

The present invention aims to provide an improved slide module.

According to the present invention there is provided a slide module comprising a first member having parallel tongues or grooves in one face and a slot substantially perpendicular to the tongues or grooves, a second member having two faces each having parallel tongues or grooves and a substantially central hole, the tongues or grooves of one face being substantially perpendicular to those of the other face, and a third member having parallel tongues or grooves in one face and a slot substantially perpendicular to the tongues or grooves, whereby the three members can interlock together forming a through-passage for a fixing bolt.

The first and third members may be integral parts of other units of the prosthesis, e.g. the first unit may be integral with the shank and the third be integral with the socket or an angular alignment device arranged between shank and socket for angular adjustment of the prosthesis.

The invention has the advantage that positive locking of the members of the slide module is provided. Further the relative positions of the members can be calibrated by counting the overlap of the grooves or tongues.

It will be understood that the second member can be adjusted in one plant (AP say) relative to the first by amounts corresponding to the width of each tongue/groove. After the correct AP adjustment is established, the third member can be similarly adjusted relative to the second member to provide for ML adjustment. The tongues or grooves of the third member are, of course, perpendicular to those of the first member. Similarly, the slot of the third member is perpendicular to that of the first.

When the three members interlock with the correct AP, ML adjustment having been established, a through-passage is formed by the two slots and the central hole. With the fixing bolt passing through this passage, the three members are locked together since each of the first and third members cannot slide relative to the second member, such sliding movement being prevented by the bolt which abuts the sides of each slot.

The slots of the first and third members are preferably formed in the face which has the tongues or grooves but this is not essential; the face must allow for movement of the hole of the second member perpendicular to the tongues or grooves of that face, but the means preventing movement of the second member parallel to the direction of the tongues or grooves can be provided in some other part of the first or third member. The preventing means is, of course, the sides of a slot perpendicular to the tongues or grooves.

The second member, which can also be called a "locking disc", can be considered as separate invention linked to the first mentioned invention by the same inventive concept. Accordingly, the invention further provides a flat locking member or disc of a slide module for a prosthetic alignment device, the disc having two opposing faces and a substantially central hole, each face having parallel tongues or grooves which are perpendicular to those of the other face.

An embodiment of the invention is described in detail below, by example only, with reference to the accompanying drawings, wherein:

Fig. 1 is a sectional view of a slide module according to an invention between the shank and socket of a prosthesis; and

Fig. 2 is a top plan view of the three interlocking members of the slide module.

Fig. 1 shows the slide module comprising first member 1, second member 2 and third member 3.

First member 1 has parallel grooves 4 on its circular upper face and a central slot 5 perpendicular to the grooves 4. The grooves 4 cover all the upper face of the first member 1, apart from the slot 5.

Second member 2 is in the form of a disc with opposing faces 6, 7. Face 6 has tongues 8 parallel to the grooves 4 of the first member 1. The opposite face 7 has parallel tongues 9 running perpendicular to tongues 8. The disc 2 has a central hole 10 of a diameter corresponding to the width of the slot 5 of the first member.

Third member 3 has on its circular lower face 11 grooves 12 parallel to tongues 9 of the disc 2. It also has a central slot 13 perpendicular to grooves 12. This slot 13 is shaped similar to the slot 5 of first member 1 and is perpendicular to it.

By the interlocking of the tongues 8 and 9 of the disc 2 with the grooves 4 and 12 of the first and third members respectively, the three members fit together. The registration of the hole 10 of disc 2 with the slots 5 and 13 provides a through-passage for the conventional fixing bolt of the prosthesis (not shown). The diameter of hole 10 corresponds to that of the bolt.

The lower locking nut 14 for the bolt is illustrated in Fig. 1. The flanged nut 14 slides within a slot 15 of a shank adaptor 16 which is moulded into the proximal end of shank 17. The nut 14 has machined flats which engage in slot 15 and thus prevent rotation under torque loading. The first member 1 has a lip 18 around its slot 4 which fits into the slot 15 of the adaptor 16. The first member is thus fitted to the shank and the nut 14, in effect, slides within the slot of the first member.

The third member 3 is part of an angular

alignment device 19 which is fitted to the socket 20. The device 19 and socket 20 are not illustrated in detail. The device 19 may be that described and illustrated in UK patent application no. 8408661.

In Fig. 2 are seen the top of the shank 17, the upper surface of first member 1 with its grooves 4, face 7 and disc 2 with its tongues 9, and the top of the third member 3. The members are at the limit of their adjustment in two perpendicular directions, i.e. the hole 10 of disc 2 registers with the end of the slots 5 and 13 of the first and third members.

To linearly adjust the alignment of the prosthesis seen in Fig. 1, the fixing bolt should be imagined passing through the three loose members of the slide unit and connecting to the nut 14. First member 1 is locked to shank 17.

The adjustment in the AP (say) plane is established by moving the disc 2 to the correct position relative to shank 18 (how the correct position is calculated is not relevant to this application). This movement (left to right in Fig. 1) causes the bolt to move along slot 5. The disc 2 can then lock with the first member through the meshing of the tongues and grooves when parallel. This locking fixes the bolt relative to the shank.

The ML linear adjustment is then established in the perpendicular direction. This movement (up and down in Fig. 2) causes the bolt to travel along slot 13. The member 3 is then locked with the disc 2. This locking fixes the bolt relative to socket 20. The bolt is then tightened against the nut 14 so the assembly cannot come loose.

It will be appreciated that any movement of each member is prevented in one direction by the interlocking of the tongues and grooves and in the other direction by the positioning of the bolt against the sides of the slots 5 and 13.

The embodiment thus provides certain locking of the aligned prosthesis and also a calibration of that alignment since the number of exposed grooves or tongues can be counted for AP and ML directions, as seen in Fig. 2.

The slide module of the invention, when combined with an angular alignment device, thus provides for both linear and angular alignment in one single unit. The linear adjustment, as well as being calibrated, is retained if the bolt is loosened to allow late angular adjustment.

As mentioned earlier, the slots of the first and third members need not be in the faces having the tongues or grooves. As an example of this, it can be imagined that the slot 13 of the member 3 is instead a central circular hole of a relatively large diameter. This hole thus allowed the movement of the bolt perpendicular to the grooves 12 of the third member 3. However, this hole does not lock the third member in position since it can slide from side to side, parallel to the grooves 12. The slot which locks the bolt in position is formed in the socket, to which socket the member 3 is fixed. It will be understood that the slot is thus in effect part of the third member and thus of the slide unit when in position.

This situation, where the member 3 does not have a slot, may occur when an angular adjustment unit of the double-wedge type is used.

The slide module is preferably formed of a thermoplastic material, e.g. nylon 6,6. The module is thus light-weight, corrosion-resistant and can be formed cheaply by injection moulding.

The terms "tongues" and "grooves" as used in here are understood to cover physical arrangements which are functionally equivalent to the tongues and grooves illustrated. For example, a single "tongue" could possibly be formed of a row of individual bosses, a single "groove" thus being formed of a row of recesses.

CLAIMS

1. A prosthetic alignment slide module comprising a first member having parallel tongues or grooves in one face and a slot substantially perpendicular to the tongues or grooves, a second member having two faces each having parallel tongues or grooves and a substantially central hole, the tongues or grooves of one face being substantially perpendicular to those of the other face, and a third member having parallel tongues or grooves in one face and a slot substantially perpendicular to the tongues or grooves, whereby the three members can interlock together forming a through-passage for a fixing bolt.

2. A slide module according to claim 1, wherein the first, second and third members are substantially flat discs.

3. A slide module according to claim 1 or 2, wherein the slots of the first and third members are in the faces having the tongues or grooves.

4. A slide module according to claim 1, wherein the slots of the first and third members are remote from the faces having the tongues or grooves, the said faces having substantially central holes dimensioned to allow movement of the bolt perpendicular to the tongues or grooves.

5. A slide module according to claim 1 or 4, wherein the first and/or third members are integral parts of a socket, shank or foot member.

6. A slide module according to claim 1 or 2, wherein the first member is attached to a shank or foot section which has a slot in which a nut slides non-rotatably, the nut being for connection to the fixing bolt.

7. A prosthetic alignment slide module substantially as herein described and as illustrated in the accompanying drawings.

8. A flat locking member or disc for a prosthetic alignment slide module, the disc having two opposing faces and a substantially central hole, each face having parallel tongues or grooves which are perpendicular to those of the other face.

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